

WHAT IS CLAIMED:

1. A method of forming material in a gap in a substrate, the method comprising:

5 forming a first material on a bottom surface of the gap, the first material having a first rate of deposition of oxide; and

depositing an oxide material on the first material to grow the oxide material in the gap toward an opening in the gap at the first rate and away from the side wall of the gap at a second rate that is less than the first rate.

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2. A method according to Claim 1 wherein forming the first material further comprises avoiding forming the first material on the side wall nearer the opening in the gap.

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3. A method according to Claim 1 further comprising:
forming a second material on the bottom surface of the gap and on the side wall of the gap, the second material having a second rate of deposition of oxide thereon.

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4. A method according to Claim 1 further comprising:
forming the gap in the substrate through a hard mask thereon prior to forming the first material in the gap.

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5. A method according to Claim 4 further comprising:
removing the hard mask from the substrate prior to forming the first material in the gap.

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6. A method according to Claim 1 wherein the first rate is about four times greater than the second rate.

7. A method according to Claim 1 wherein a depth of the gap is at least about eight times greater than a width of the gap.

8. A method according to Claim 1 wherein the first material comprises a

first oxide layer and wherein depositing an oxide material comprises:

introducing an ozone amount in a range between about 1 liter and about 18 liters to provide a concentration in a range between about 1.0% by weight and about 18% by weight to an environment containing the substrate; and

5 introducing a TEOS to the environment at a rate in a range between about 100sscm and about 1200sscm.

9. A method of forming material in a gap in a substrate, the method comprising:

10 forming a pattern to define a gap on a substrate;

forming a bottom oxide layer on a surface of the substrate and substantially filling the gap;

etching back the bottom oxide layer inside an opening in the gap to expose side walls of the gap so that a residual bottom oxide layer remains at a bottom of the gap; and

15 selectively depositing a top oxide layer on the residual bottom oxide layer, wherein the top oxide layer is deposited in a first direction toward the opening at a faster rate than in a second direction away from the side walls.

20 10. A method according to Claim 9 wherein forming a pattern comprises:

forming a hard mask pattern exposing a part of the substrate;

etching the substrate using the hard mask pattern as an etch mask to form the gap; and

25 conformally depositing a silicon nitride layer liner on a surface of the substrate including on the side walls of the gap.

11. A method Claim 9 wherein the step of forming a pattern comprises:

forming a hard mask pattern on the substrate exposing a part of the substrate;

30 etching the substrate using the hard mask pattern as the etch mask to form the trench; and

removing the hard mask pattern.

12. A method according to Claim 11 wherein forming a trench oxide layer inner sidewall in the trench is performed before removing the hard mask pattern.

13. A method according to Claim 9 wherein the top oxide layer is formed using ozone and TEOS as a source gas at a pressure in a range between about 200 torr and about 760 torr and at a temperature in a range between about 400°C to 480°C
5 temperature in an environment containing the substrate.

14. A method according to Claim 13 wherein an amount of ozone in a range between about 1 liter to about 18 liters is introduced to provide a concentration is a range between about 1% by weight and about 18% by weight, and TEOS is
10 provided a rate in a range between about 100sccm and about 1200sccm.

15. A method according to Claim 9 wherein forming a bottom oxide layer comprises forming the bottom oxide layer to a thickness in a range between about 100 Angstroms and about 3600 Angstroms.

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16. A method of forming material in a gap in a substrate, the method comprising:

forming a bottom oxide layer only at a bottom of a gap in the substrate; and
selectively depositing a top oxide layer on the bottom oxide layer, wherein the
20 top oxide layer is deposited in a first direction toward the opening at a faster rate than
in a second direction away from side walls of the gap.